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SURVEY OF THE
STATUS OF THE EXISTING
PROCESS WASTE LINES

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I. INTRODUCTION

Recent changes of philosophy on the subject of environmental control at the Rocky Flats plant have led to changes in the handling of process waste. In the past, leak detection in pipelines has been extremely difficult or inaccurate, delaying necessary repairs. In conjunction with the construction of a new aqueous waste treatment plant (Building 374), a new process waste line has been installed which is doubly-contained, providing a secondary barrier to contain leaks. This new system is also completely inspectable.

Rather than simply abandoning the old lines, it becomes necessary to concern ourselves with the condition of the original process waste collection system. These lines are not only uninspectable, but have been in heavy use, in part, for 25 years and have required numerous repairs and modifications in that time. It is possible that some portions of these lines may present a residual hazard after being placed in idle status. Varying conditions may require more extensive actions than simply flushing and sealing the lines. In the extreme, filling or complete removal may be necessary.

In response to a request made by J. A. Watt, ERDA-RFAO, in the fall of 1975, an outline was initiated by B. L. Kelchner of Waste Processing to define the data needed to analyze the problem.

The following engineering study is a collection of information concerning the existing process waste collection system which will be removed from service and ultimately abandoned when the new waste treatment facility is operative. In order to assist in making a judgement concerning the disposition of these lines, data has been tabulated that includes: line sizes, location, age, materials of construction, operating data, and unusual operating incidents. To supplement the criteria concerning possible environmental hazards, soil samples were taken and analyzed in areas of known leaks and repairs. The final step in the study was a library search for new developments in the area of pipe cleaning. This study includes lines buried in the field and waste collection tanks, both inside and out of the buildings.

II. SUMMARY

The purpose of this study was to gather pertinent data for use by qualified consultants rather than to state conclusively the final disposition of these lines. However, a few general observations are the natural consequence of any exposure to analytical data. As the study progressed, some conclusions became obvious which might be helpful in minimizing the complexity of the problem.

One major factor in considering abandonment of any of the lines is that several times in the past, leaks have been caused by equipment accidentally breaking into a line. It is likely that, once the lines are no longer in use, consciousness of their existence will become increasingly obscure. Filling of these abandoned lines with some inert material would confine contaminants if future construction activities should damage the lines.

One example where removal would be both practical and desirable is the old saran-lined pipe than runs between 881 and 707. The line was installed in 1952 and has had heavy usage and numerous repairs since that time. Since the line is doubly-contained, removal of the 3" inner saran-lined steel pipe could be accomplished without excavation by pulling the line through the 10" vitrified clay pipe casing. Waste treatment personnel, under the direction of M. E. Maas have already successfully removed 120' of the line in this manner. Because the line was, at that time, the only means of transferring process waste from the south side of the plant to 774, no attempt was made to remove the longer pieces of line. Since the line was abandoned in 1975, this method would be an economical, expedient way to eliminate one area of concern.

An area where a strong argument could be made for abandonment in-place is the line running east-west between 444 and 883. Although the line is old and pipe material is cast iron, it has carried only very small amounts of depleted uranium and nitrates. A soil sample at the location of the only known break in the line was found to contain 62 ppm NO_3. Plutonium 239 is near background level at this same location.

Soil samples were obtained from areas known to be contaminated as a result of leaks. The soil sample results indicate that pipeline removal would not require removal of surrounding soil. Assuming that these soil sample results are typical, they do not by themselves constitute a basis for removal of the lines. It should be noted that the samples taken from the 700 Area (samples 4-9) are above plutonium background level which is approximately 0.03 d/m/g. The two taken in the south part of the plant (samples 1-2) are closer to background. An expanded soil sampling program would define the boundaries within which contamination levels are higher than normal.*

Although there are no established levels for nitrates in soil, the sample results are not high. They do verify that there has been leakage.*

*Evaluation of the soil sample analysis was made with the help and direction of Merlyn R. Boss and Daryl D. Hornbacher of Health and Environmental Science.

Disposition of lines in the 700 Area will require careful consideration. Decisions should be made on a case by case basis. After the process waste lines are no longer in use, samples taken from the inside of the lines would be very helpful in gauging any residual hazards. The description of these lines contained in the process waste lines section of this report and the process waste summary should be helpful in determining the condition of these lines.

III. PROCESS WASTE STREAMS

These streams originate from production and research activities and laboratory, laundry, decontamination, and janitorial operations. Aqueous chemical and radioactive waste are generated in Buildings 123, 444, 707, 771, 776, 779, 865, 881, 883, and 889. Each tank of waste is sampled before shipment and, depending on the level of radioactivity and chemical composition, can be routed to Building 774 for treatment, Pond B-2 on South Walnut Creek, or the solar evaporation ponds, Facility 207. Average volume and level of contamination have varied over the years as various building operations have been changed. Usage, in general, has been high and both lines and tanks normally contain liquids. Monthly averages covering all years the plant has been in operation are listed in Appendix 2 for each building.

IV. PROCESS WASTE HOLDING TANKS

To be consistent with the current philosophy on environmental protection at the Rocky Flats plant, process waste holding tanks must be made double-contained and inspectable. Some have already been modified by placing a new tank inside the old one. Others are under authorization as part of construction projects to be made doubly contained.

In 1971, several sample wells were drilled around the buried tanks so that they could be regularly monitored for releases to the environment. Twice a year, liquid samples are taken from the sample wells and they are analyzed for plutonium, americium, uranium, and nitrates by the Health and Environmental Science Laboratories.

In assessing any potential environmental hazard, Appendix 2 will be helpful. The highest level of contamination and usage history of each building's process waste is listed. This is, of course, the same waste that has been carried by the process waste lines. Tank material, capacity and age are tabulated in the table included in this section of the study.

PROCESS WASTE HOLDING TANKS

Bldg.	Location, Depth	Name/No.	NI(2)	Capacity (gallons)	Dimensions (feet)	Material	Age (years)	No./Mo.(1)	Notes
889	In pit W of bldg., 15' deep	/2	x	1,000	5x7x4.25	concrete with carbolene lining	10	3 in 6 mos.	to be made double contained under Auth. 385050
776	N of 776 (N 37080 E 20911.5), 26'	A&B/2 C&D/2	x x	22,500 4,500	25x15x10 5x15x10	concrete concrete	20	5	
771	N of NE corner of bldg., 18'	A&B/2	x	20,000	22x15.5x7.5	concrete	23	2	
707	E side of 707 (N 37080 E 20911), 20'	2		3,000		fiberglass	2	5	placed inside old concrete tanks
865	located on the first level, Column C-4, 15'	2	x	3,000		concrete	6	6	to be double contained, Auth. 385050
779	basement level, Column C-5, 10'	1A&1B/2 2A&2B/2	x x	8,000 1,000	22x9x7.5 5x9x7.5	concrete concrete	11 11	1	to be double contained, Auth. 375030
444	basement level, Col. F, E-6, 7	T2-T3/2 2	x x	3,500 500	7.5x12.5	steel concrete with floor drain	23 23	17	to be made double contained, Auth. 385050
122	SE of bldg., underground	1	x	800		stainless steel	23	7	
887	lower level	7		2,700		stainless steel	23		
881	Room 114A	4		250		stainless steel	23	7	2 for caustics 2 for HNO_3 & Be
559	in holding pit SE of bldg.	1&2/2		1,800	7x9	stainless steel	10	2	
		3/1		500	3.5x8	stainless steel	10		
883	basement - Room 1	2 2 1		1,000 1,000 750		welded steel welded steel welded stainless steel	10	3	
886	18 feet W of bldg.	1		300		steel			aboveground, transported by portable tanks

PROCESS WASTE HOLDING TANKS (continued)

Bldg.	Location, Depth	Name/No.	NI(2)	Capacity (gallons)	Dimensions (feet)	Material	Age (years)	No./Mo.(1)	Notes
441	S of bldg. (holds 123 process waste), 6'8"	1	x	3,000	13.25x13		23	7	
774		2	x	14,000				30	
		1	x	30,000					

(1) Present number of tank shipments per month. Based on first five months of 1976.

(2) Not Inspectable

V. PONDS

Low-level waste from the buildings and filtrate from the Building 774 second stage operations are sent either to the solar evaporation ponds, 207-A, B, C or discharged off-site to Pond B-2 on South Walnut Creek.

In the Process Waste Summary, Appendix 2, 207-A, B are referred to as 2-A and 2-B, respectively. These were the original terms used to identify these ponds.

Of the ponds on South Walnut Creek, only one is used for process waste. It was previously the Building 995 Pond (later called Pond 3). It is now Pond B-2.

Solar Evaporation Ponds	Dimensions (ft)	Capacity (gal)
207-A	521 x 250	Operational - 5,112,000 Overflow - 6,155,000
207-C	248 x 168	Operational - 1,286,000 Overflow - 1,673,000
207 B-1	*250 x 181	Operational - 1,583,000 Overflow - 2,188,000
B-2	*250 x 181	Operational - 1,705,000 Overflow - 2,310,000
B-3	*250 x 181	Operational - 1,710,000 Overflow - 2,315,000

*Depths vary

S. Walnut Creek Ponds	Type of Waste	Capacity (gal)
B-2	Laundry Waste	1.9×10^6
B-1	Sanitary Waste	0.8×10^6
B-3	Sanitary Waste	0.9×10^6
B-4	Sanitary Waste	0.6×10^6

VI. PROCESS WASTE LINES

The process waste lines presently in use vary greatly in age, material and usage history. Consequently, any decision concerning their ultimate disposal will vary from line to line.

In general, the system is gravity-flow and vented so the lines have not been subject to any pressure. The line coming from Building 444 to Building 883 is pumped but is essentially at atmospheric pressure due to its large 4" diameter and the low volume of waste carried from this area. The line coming from 881 north to 883 is also pumped but pressure should not exceed about 10 psi.

The only thermally hot waste coming through the lines has been steam condensate from Building 881. Although the temperature should not have affected the saran-lined steel used in this line, the steam condensate is believed to be the probable cause of numerous leaks at the 45° elbows of the lines. The steam caused expansion in the flanges which allowed acids in the waste to corrode the outer mild steel. (For more information, see Appendix 1-A 2.)

The following table is a collection of data concerning the process waste lines which will be superseded by the new, double-contained system. Line sizes, length, age, and materials of construction have been tabulated. The operating data and leak information are contained in the appendices. The last column of the table refers to the appendix which contains information pertinent to each line.

OUTSIDE PROCESS WASTE PIPES

General Location	Pipe Material	Pipe dia. (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
See Appendix 4-Dwg. 15507-1					
400 Area					
exits S side of 123; ends at E18623.5	polyethylene in steel	3 inside 4	120	1968	see Appendix 2; bldg. 123
begins E18623.5; enters 441 at N36081.8	vitrified clay	4	162	1952	see Appendix 2; Bldg. 123
begins 441 tank; connects 441, 444 & 883 (N36056)	cast iron	4	1,193	1952	see Appendix 2; Bldgs. 123, 441, & 444; see Appendix IA, III, & IV
800 Area					
connects 881 to valve pit W of 884 (N36232 E20560)	steel	3	865	1957	see Appendix 2; Bldg. 881
connects 883 to valve pit W of 884	steel	3	504	1957	see Appendix 2; Bldg. 883
exits S side of 881; connects 81 & 89	stainless steel	2	78	1952	see Appendix 4; Dwg. 15507-1 Detail 1 and Appendix 2 Bldg. 881
exits S side of 881; connects 81 & 89	stainless steel	3	140	1952	
exits S side of 881; connects 81 & 89	stainless steel	4	158	1952	
connects 865, 889 to N36191; E20560	stainless steel	3	550	1968	see Appendix 2; Bldg. 865 & 889 see Appendix 4 Dwg. 15507-1 Detail 2
Main north-south line (E20560)					see Appendix 2; Bldgs. 881, 865. 889, 883, 441, 444, & 123
begins valve pit W of 884; to just N of Central Avenue	new FG inside old VCP	3 inside 10	165	FG 1975 VCP 1952	see Appendix IA-1
N of Central to valve pit W of 707 (N36910)	3" saran-lined steel in 10" VCP		573	1952	see Appendix IA-1
N of Central to valve pit W of 707 (N26910)	3" ribbed hose in 4" FG reinforced epoxy		523	1975	
begins valve pitW of 707; ends N707 (E21058)	stainless steel	3	878	1968	see Appendix 2; Bldgs. 123, 444, 559, 707, 865, 889, 881, & 883
diagonal (N36910 E20560 to N37370 E21058) then N to N36581 E21058	3" saran-lined steel in 10" VCP		942	1952	see Appendix 2; Bldgs. 441, 444, 123, 881, 883 (abandoned 1968), and see Appendix IA, II

OUTSIDE PROCESS WASTE PIPES (continued)

General Location	Pipe Material	Pipe dia. (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
559 Area					
exits E side of 561 (N37072); connects to main line (E20560)	polyvinyl chloride	3	170	1968	see Appendix 2; Bldg. 559
exits SE side of 559 (N37124 E20370) enters NE 559 (N37216 E20406)	glass	4	135	1968	see Appendix 2; Bldg. 559
exits S of 559 (E20278); enters W of 561 (N37071.5)	rigid teflon	2 3/4	150	1968	see Appendix 2; Bldg. 559
See Appendix 4 Dwg. 15507-2					
700 Area					
N 707 (N37292 E21058) to N 777 (N37681 E20990)	stainless steel	3	455	1968	see Appendix 2; Bldgs. 123, 444, 559, 707, 865, 883, 889, & 881
N 777 to Bldg. 774 (enters W side at N38025)	stainless steel	3	336	1952	see Appendix 2 all bldgs. except 771
E 707 (N37132) to N 707 (N37284)	stainless steel	3	186	1968	see Appendix 2; Bldg. 707
exits N 771 (E20588) to 771 tanks (N38207)	cast iron	6	85	1966	see Appendix 2; Bldg. 771
771 tanks to reducer N of 774	cast iron	6	180	1966	see Appendix 2; Bldg. 771 & Appendix IB & III
reducer N of 774 to valve pit N of tank 207 (N37820)	stainless steel	3	516	1972	see Appendix 2; Bldg. 771 & Appendix IB & III
See Appendix 4 Dwg. 15507-2					
700 Area					
774 to N37931 E21077	stainless steel	two 3" pipes	185	1968	see Appendix 2 treated waste from 774 to ponds
N37931 E21077 to valve pit N of tank 207	stainless steel	two 3" pipes	111	1972	see Appendix IB-1
tunnel between 771 & 774	plastic hoses	three 1" pipes two 2" pipes			see Appendix 2; 771 into 774 first stage
exits N 776 (E20769.5) to 776 tanks	cast iron	6	72	1957	see Appendix 2; Bldg. 776
776 tanks to Ponds (N37715.3)	steel	3	1,055	1957	
776 tanks to valve pit N of 207 (N37820)	stainless steel	3	402	1957	see Appendix 2; Bldg. 776
exits W side 779 (N37552) to valve pit N 77 (N37715 E21056)	stainless steel	3	164	1957	see Appendix 2; Bldg. 779
779 to valve pit N of 777	stainless steel	3	44	1957	
W 771 (N3791) to 771 tanks (N38207)	fiberglass	10	395	1969	see Appendix 2; Bldg. 771
lines around tank 207	steel	3	230	1965	
	vitrified clay pipe	4	153	1952	
	vitrified clay pipe	6	[illegible]	1966	

OUTSIDE PROCESS WASTE PIPES (continued)

General Location	Pipe Material	Pipe dia. (inches)	Total Feet	Year Installed	Usage, Leaks, and Repairs
Ponds					
exits E 774 (N38075) to Pond 207-A	polyvinyl chloride	two 1.5"	~1,500		see Appendix 2
valve pit NE of tank 207 to off site (E23700)	vitrified clay pipe	10	~ 660		
	vitrified clay pipe	6	~2,190		
from N37335 E22652 to N37287 E23239	vitrified clay pipe	6	~ 590		abandoned see Appendix 2; Bldg. 774 to Bldg. 95 ponds
from valve pit NE of tank 207 (N37713 E21050) to ponds 207 A & B	steel	3	~1,190		
connects 207 & 207 A	cast iron	8	85		

VII. APPENDICES

Appendix 1-A and 1-B describe leaks and repairs. 1-A is crossreferenced to Drawing 15507-4 in Appendix 4. 1-B is crossreferenced to Drawing 15507-5 in Appendix 4. Appendix 2 is a summary of the wastes carried by the lines over the years. Appendix 3 contains the results of eight soil samples taken in areas of possible contamination from leaks. These areas are also marked on the drawings in Appendix 4. The first columns of the Process Waste Lines Table locate the piece of line being described. Reference points and coordinates refer to the drawings in Appendix 4.

APPENDIX 1-A - LEAKS AND REPAIRS
(Notes on Drawing 15507-4)

A. The line between the 884 valve pit and the valve pit east of Building 557 (guard station) was found to have a leak rate of 2.7 gal/hr at 20 psig (65 gal/day) in May 1971 by International Leak Detection Services in Houston, Texas. This line (E20560 from N36232 to N36910) is 3" mild steel lined with saran and encased in a 10" vitrified clay pipe. The line was installed in 1952 and abandoned in 1975. The remaining piece of line (going from the valve pit of N36910 to the valve pit east of Building 557) is 3" stainless steel and was placed in 1968. The first 120' north of the 884 valve pit was repaired as follows: the 10" VCP containment was kept in place but the inner 3" saran-lined pipe was replaced with a 3" ribbed hose. Just north of Central Avenue (even with the concrete anchor for the power pole) a new double-contained line (3" ribbed hose in 4" FG-reinforced epoxy) jogs to the west of the old line about 4 ft. and continues north, parallel to the abandoned 3" saran-lined pipe and 10" VCP containment. A soil sample and clay tile pipe sample taken in May 1972 (Report PRD 950463-107) of the abandoned line showed no measurable amount of contamination and a visual inspection showed only surface rust. Some bolts at the flanges were tested and found to be in good condition. A soil sample was taken for this study at the 884 valve pit (see Appendix 3 for a sketch). Analysis results showed Pu^{239} - 0.049 d/m/g and NO_3 - 110 ppm.

B. There is an abandoned line from the valve pit at N36910 E20560 (West of 707) running at a diagonal to the northeast and ending at N37370 E20990. The line is 3" saran-lined steel in 10" vitrified clay containment.

A large portion of it lies under Building 707 which was built after the line was abandoned in 1968. Substantial leaks occurred at the elbow connections during its use due to expansion from steam condensate from Building 881. Leaks of acidic process waste resulted in corrosion of the outside mild steel. The abandoned line continues north from the joint at N37370 E20990 and is buried beneath Building 777. It is probable that portions of all this line were removed as excavation for 707 and 777 made necessary. One bad leak occurred in December of 1958 when the south 45° elbow broke and process waste followed the containment pipe to the north 45° elbow and leaked into a ditch. From Building 881, 2,700 gallons of lab waste (radioactivity .51 ppm enriched uranium, pH 5.6, NO_3 120 ppm) and 2,700 gallons of laundry waste (radioactivity .51 ppm enriched uranium, pH 9.4) was sent and 1,350 gallons were received in 774. The elbow was repaired and the line remained in use for another 10 years. A soil sample taken for this study at the valve pit west of 707 (see Appendix 3, soil sample #4) showed Pu^{239} - 0.145 d/m/g and NO_3 - 54 ppm.

C. The east-west line running at N36030 and connecting Buildings 122, 123, and 444 to a junction with the north-south line west of Building 883 is the original 4" cast iron pipe with bell-and-spigot construction and is about 23 years old. Significant leaks were found in the joints by International Leak Detection Service in 1971. Leak rate was determined to be 2.5 gal/hr at 37 psig. The line itself seemed to be intact and the joints were repacked to stop further leakage. The line was tested under pressure greater than that normally found under ordinary working conditions. Report PRD 950463-107, May 1972 by Hornbacher and Lott describes the problem and repair in detail.

D. A break in the line close to the driveway of Building 663 occurred around 1960 to 1962. The line chipped as trucks backed over the shallow cover and the leak was detected as water bubbled to the ground surface. A small portion of the line was replaced and no subsequent leaks were reported.

E. A piece of line right under the outside perimeter road (this line goes off-site to Pond B-2) was broken by a cable-laying operation and recovered. The leak was detected by excess water in the culvert and subsequently repaired by replacing a piece of the line.

APPENDIX 1-B - LEAKS AND REPAIRS
(Notes on Drawing 15507-5)

A. The two parallel lines running between 774 and the valve pit north of tank 207 were found to be leaking badly in the old cast iron sections. The 3" line had a leak rate of 14 gal/hr at 20 psig. The parallel 4" line had a leak rate of 45 gal/hr. Both were replaced in April 1972. Soil sample #8 taken east of the valve pit north of tank 207 showed Pu^{239} - 1.83 d/m/g; NO_3 - 76 ppm.

B. The valves on the north of 777 (N37715 E21055) were found to be leaking in 1971 at a rate of 25 gal/hr at 20 psig. A valve pit was constructed in May 1974. Soil sample #6 showed Pu^{239} - 0.05 d/m/g; NO_3 - 105 ppm.

C. North of the new waste packaging facility joining 771 and 774, a leak rate of 15 gal/hr at 20 psig at the junction of a 6" cast iron with a 3" steel line was found in 1971 by International Leak Detection Services. The 3" steel has since been replaced with a 3" stainless steel line when the waste packaging facility was added in 1972. Soil sample #9 was analyzed to contain Pu^{239} - 3.385 d/m/g and NO_3 - 44 ppm.

APPENDIX 2 - PROCESS WASTE SUMMARY

These data were taken from the records of shipments to and from Building 774 kept by M. E. Maas, Waste Treatment Supervisor. The records were summarized to find the highest concentrations of radioactivity and chemical contamination that have been present in the process waste lines and tanks. Because of the huge amount of data and time limitations, approximately one-fourth of the data was selected to be tabulated. In most cases, there was little variation in monthly volumes and three months were picked at random (usually January, May, and October). When a marked change was noticed in usage, the month with the highest total volume was used. At times, it was possible to scan the entire year and total the volume. Those places have been marked as yearly totals.

Units and notation are the same as in the original records. The notes which clarify which substances are referred to in the activity column were given by Bob Carpenter, Assistant Manager of General Labs.

APPENDIX 2 - PROCESS WASTE SUMMARY

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123	2-7
886	2-7
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Treated Waste from 774 to Ponds	2-9
Raw Waste to Ponds	2-11

Building 771 - Waste into 1st Stage of 774 - see Footnote - Page 2-7

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
441	Lab waste - low level activity is total uranium with 98% depleted uranium	1953	31,300	3.2 ppm				
		1954	17,800	4,600 d/m/l				
		1955	14,900	.01 gu/l	1,066			
		1956	12,600					
		1957	9.600					
		1958	16,000					
		1959	16,530					
		1960	27,900					
		1961	30,300					
		1962	30,500					
		1963	39,700					
		1964	17,600					
		1965	21,800					
		1966	27,200					
	Converted to office building in 1967.							
883	Janitor water and process waste	1959	3,300	3.3 gT/l	146 ml			
	Total gallons for year	1960	2,600	3.9 gT/l				Th<100 ppm
	Total gallons for year	1961	400	1.02 gT/l				
	depleted uranium	1973	2,800	46 x 10^6 d/m/l	5,800	30.9	.4-9.8	Be .1 ppm
		1974	5,100	33 x 10^6 d/m/l	182,000			
		1975	3,200	30 x 10^6 d/m/l			<1-13.0	U238-4600 ppm
		1976	950	1.4 x 10^6 d/m/l				.6-9.4
881	Laundry waste; process & lab waste; caustic	1953	52,430	.060 ppm			1.0-2.5	I 28,700
		1954	43,580	.34 ppm	103,750		2.0-11.5	F 126,000
	95% enriched uranium U-235	1955	69,960	1.22 ppm	440,000		5.3-12.0	Cr 20

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1956	74,230	.48 ppm	409,000		0-12	
	This is the only building that sent some	1957	16,800	4.9 ppm	20,500		2.5-11.7	F 20,200 I 14,000
	that sent some thermally hot waste through	1958	79,230	.76 ppm	900		3.1-12.3	Cr^{+6} <1
	the lines in the form of steam condensate	1959	27,130	14.0 ppm			6.5-11.1	
		1960	82,100	19 ppm	<100		3.2-12.0	
		1961	138,800	1.6 ppm	860		3.0-12.0	
		1962	60,830	.58 ppm	350		2.2-12.2	
		1963	123,600	1.4 ppm	400		2.4-12.0	
		1964	129,400	1.2 ppm	545		2.4-12.3	
		1965	90,920	3 ppm	435		3.1-11.9	
	Year total volume	1966	64,800	1.8 ppm	19,000		1.3-6.8	
		1967	54,900	1.3 ppm	17		2.4-9.4	
		1968	65,230	1.92 ppm	4,800		1.8-11.7	
		1969	4,500	12.6 ppm	11,800		1.5-12.3	
		1970	2,700	.35 ppm	116		3.3-3.5	

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg.	General Types and Levels of Contamination	Year	Monthly[3] Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1971	4,500	11 ppm	1,660			
		1972	24,660	10^7 d/m/l	25,800			1.7×10^6 d/m/l Pu
		1973	7,630	210,000 d/m/l	2,870			6,900d/m/lPu U235-.7 ppm U238-150 ppm
		1974	19,560	600,000 d/m/l	9,000			170,000 d/m/l Pu U235-3.3 ppm U238-210 ppm
		1975	3,130	2.7×10^5 d/m/l				310,000 d/m/l Pu U235-.64 ppm U238-155 ppm
		1976	6,200	1.7×10^6 d/m/l[1]				220,000 d/m/l Pu U235-3.5 ppm U238-1300 ppm
444	Process waste - depleted uranium	1953	28,230	240 ppm	8,750		8.2-9.4	Fe 60 ppm
		1954	16,700	416 ppm	72,000		6.9-8.4	Fe 0 CO_3 144 ppm
		1955	22,300	267 ppm	4,000		7.4-10.8	Fe 55 ppm
		1956	30,700	2.18 gT/l[2]	2,400		2.4-11.1	Fe 90 ppm
		1957	47,100	.52 gT/l			10.5-12	
		1958	87,600	.106 gT/l	205		9-12	Fe 85
		1959	41,200	.129 gT/l	92	19	10.5-12	Fe 47
		1960	43,670	.01 gT/l	<10		11-12.5	
		1961	47,670	.028 gT/l	165		10.5-12.0	
		1962	41,670	.0039 gT/l	775		9.0-12.3	
		1963	61,600	.0158 gT/l	122		3.1-12.5	

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume[3]	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
		1964	59,030	.019 gT/l	173		2.6-11.6	
		1965	41,300	.044 gT/l	435		3.7-11.3	
		1966	61,000	.051 gT/l	732		3.8-11.3	
		1967	17,910	.029 gT/l	19	<.05	3.4-8.6	
		1968	41,700	.25 gT/l	9.5	<.05	2.8-11.9	
		1973	4,900	110,000 d/m/l	<5	105	2.1-13.2	
	Year total	1974	3,600	28,000 d/m/l	10	<.05	8.2	
		1975	3,470	77,000 d/m/l	76	.1	2.9-9.9	PO_4 12 ppm
	Year total	1976	2,300	5,600 d/m/l			9.9	
559	Lab waste - activity refers to plutonium	1969	4,960					
		1970	9,550					
		1971	4,450					
		1972	5,120					
		1973	3,430					
		1974	1,770					
		1975	3,630					
		1976	1,800	8.5×10^6 d/m/l				6.31×10^{-5} g/l-Pu $<4.29 \times 10^{-6}$ g/l Am

1 = total alpha in disintegrations/minute/liter

2 = gT/l is grams of tuballoy (U-238) per liter

3 = all volume in gallons

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
889	Decontamination water contains both uranium	1969	1,000	14.7 ppm 2.3×10^6 d/m/l	5,000	<.05	10.2-12.5	
	and plutonium Year total	1970	1,000	2.3×10^5	<5	<.05	9.9	
	Year total	1971	1,000	4.8×10^5	<5	<.05	5.8	
		1972	1,000	1.3×10^5	11,100	52	5.4-9.6	
		1973	2,500	4.9×10^5	117	.1	7.6-12.6	
		1974	1,400	4.6×10^5	55	.74	11.6-13.5	
		1975	1,600	3.1×10^5			1.7-8.5	2,400d/m/lPu
		1976	na entries					

122 Small amount of low-level waste - it is held in an underground tank and transferred to a portable tank which is transported to either 774 or one of the ponds depending on the level.

123 Small amount of low-level lab waste but with nitrate ion concentration (raw waste to 207 ponds).

886 Small amount of waste held in aboveground steel tank and transported by portable tank (U-235).

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
776	High volume - high activity (prior to 1969	1969	149,000	13×10^6 d/m/l	117	<.05	7.7-10.3	
	waste was low-level and transferred	1970	164,000	39×10^6 d/m/l	<5	<.05	6.2-12.2	
	directly to the ponds - see raw waste	1971	68,900	86×10^6 d/m/l	138	<.05	2.1-9.8	
	section). Activity refers to plutonium.	1972	136,300	630×10^6 d/m/l	35,100	<.05	6.7-10.4	
		1973	112,900	3.77×10^9 d/m/l	<5	<.05	5.8-9.5	
		1974	40,100	17.2×10^6 d/m/l	<5	<.05	4.0-10.3	31.6×10^6 d/m/l Pu
		1975	26,900	58×10^6 d/m/l	<5	<.05	5.0-10.5	
		1976	25,000	6.86×10^6 d/m/l	<1	<.05	9.9-11.2	

NOTE:

771 Waste into first stage of 774 - all this waste was transferred in lines that run through a tunnel between 771 and 774 and are thus double-contained and inspectable. This waste was summarized for 1953-1966 and this summary is contained. After 1966 the volume was greatly increased and time limitations prevented a summary of more recent years.

PROCESS WASTE DATA SUMMARY - FLUIDS INTO 2ND STAGE OF 774 (continued)

Bldg.	General Types and Levels of Contamination	Year	Monthly Average Volume	Highest Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other
771	Janitor waste and decontaminated water (prior to 1969 waste was low-level and transferred directly to the ponds - see raw waste section). Activity refers to plutonium.	1969	25,600	1.9×10^6 d/m/l	39	<.05	4.1-7.8	
		1970	46,500	8,000 d/m/l	108	<.05	5.4-8.4	
		1971	14,000	14,000 d/m/l	10	<.05	7.6-8.8	
		1972	7,700	7,700 d/m/l	100	<.05	3.5-7.4	
		1973	8,700	5,100 d/m/l	650	<.05	3.3-11.6	
		1974	5,500	210,000 d/m/l	20	<.05	7.4-10.3	
		1975	6,000	4,200 d/m/l	<5	<.05	6.8-7.9	
		1976	4,200	1,300 d/m/l	21	<.05	5.7-6.6	
707		1972	18,200					
		1973	12,000					
		1974	8,300					
		1975	8,100					
		1976	8,000					
779		1972	11,400					
		1973	9,200					
		1974	8,000					
		1975	4,300					
		1976	5,000					

TREATED WASTE FROM 774 (TANKS 66, 67, 68) TO PONDS

Description		Year	Monthly Average Gallons Volume	d/m/l Activity	NO_3 (ppm)	CR^{+6} (ppm)	F^- (ppm)	Beta
To Pond 2-A (207-A)	Year total	1956	200,000	200,000				
		1957	181,000	60,000	9,600			
		1958	233,500	32,000	22,000			
		1959	110,100	200,000	64,000			
		1960	108,000	154,800	715,000			
		1961	26,700	4,400	25,000			
		1962	no entries					
		1963	no entries					
		1964	86,200	19,000	41,200			
		1965	223,100	40,000	68,000			
		1966	280,000	23,000	110,000	<.05	1,000	
		1967	129,000	52,000	135,600			
		1968	145,500	130,000	87,900			
Year total		1969	78,850	190,000	52,000			
		1970	94,600	130,000	70,400			
		1971	196,000	37,000	59,700			
		1972	266,300	200,000	151,200			
		1973	292,000	320,000	70,400			
		1974	195,000	30,000	90,000			770,000
		1975	253,600	30,000				2.1×10^6
		1976	172,650	27,000				4.2×10^5
To Pond 2-B (207-B)		1960	40,800	5,800	21,000			
		1961	96,340	18,000	26,000			
		1962	140,900	9,400	35,000			
		1963	142,400	7,100	45,200			
		1964	114,900	11,000	56,600			
		1965	288,400	24,000	113,000			
		1966	230,600	12,000	90,000			
		1967	144,300	55,000	98,200			
		1968	82,100	150,000	93,600			
		1969-1972	no entries					
Year total		1973	9,900	34,000	69,600			
		1974	221,000	29,000	166,400			
		1975-1976	no entries					

TREATED WASTE FROM 774 (TANKS 66, 67, 68) TO PONDS (continued)

Description	Year	Monthly Average Gallons Volume	d/m/l Activity	NO_3 (ppm)	CR^{+6} (ppm)	F^- (ppm)	Beta
To Building 95 Ponds (Pond 3)	1954	68,700	440	3,300	.18 ppm U		
	1955	47,800	693	4,850		20 ppm	
	1956	54,940	900	10,000	<.05		
	1957	143,100	2,000	5,800			
	1958	104,700	1,000	6,800	<.01	125	
	1959	82,500	2,200	5,900	<.05	>100	
	1960	100,600	1,100	1,300	<.05	50	
	1961	199,000	1,000	800	<.05	50	
	1962	158,800	1,100	995	<.05	60	
	1963	218,300	2,700	620	<.05	40	
	1964	200,800	1,400	880	<.05	20	
	1965	45,900	1,700	480	<.05	40	
Total year	1966	242,400	2,100	650	<.05		
	1967	146,300	1,700	388	<.06		
	1968	no entries					
	1969	212,700	5,300	53	.18		
	1970	204,500	1,600	22	<.05		
	1971	93,700	2,700	<5	<.05		
	1972	57,140	3,000	28.4	.52		
To Sewage Tank 990		Average					
	1973	67,730	1,600	12 ppm	<.05 ppm		

RAW WASTE TO PONDS (FOR BREAKDOWN BY SOURCE - SEE COMPLETE DATA)

Description		Year	Volume	U-235	U-238	NO_3	CR^{+6}	Other (ppm)	pH	Pu
To Pond 2-A	Year Total	1956	101,580	9,200 d/m/l						
		1957	215,800	34,800		550 ppm	16 ppm	F 154,000 I 6,020	3.1-11.7	
		1958	77,600	168,600	1.31 g/l				2.0-11.8	
		1959	66,100	5.7 ppm	.45 g/l		<1			
		1960	87,500	14 ppm	1.1 g/l			1.1 g/l		
		1961	48,500	15 ppm	1.72 g/l					
		1962	56,200	2 ppm	1.23 g/l					
		1963	no entries							
		1964	108,200	2.1 ppm	1,500 d/m/l .625 g/l	<5 ppm			10.4-12	
		1965	104,800	2.2	.05 g/l	240	<.05	F 100	6.6-11.7	
		1966	106,000	2.9		38,000				
		1967	691,504	.78 ppm		9,600				
		1968	235,900	39 ppm		195			2.7-7.5	
		1969	70,750	1.25		8,480	30.8			
		1970	94,750	5.8		10,120	110		1.2-10.9	
		1971	267,100	4.6	1,056 ppm	492	210	Be 100 ppm	1.5×10^6 d/m/l	
		1972	94,000	5.4	647	3,000	24.2	Be 1.15	3.5-11.7	.027g/12600d/m/l
		1973	154,600	180,000 d/m/l		5,800	194			5,100 d/m/l
		1974	125,400	150,000 d/m/l	1.7 ppm	338	.24			5,800 d/m/l
		1975	122,100	27,000		135	.13	PO_4 29		9,600 d/m/l
		1976	103,600	26,000 .41 ppm	.46 ppm	<1				21,000

RAW WASTE TO PONDS (FOR BREAKDOWN BY SOURCE - SEE COMPLETE DATA) (continued)

Description	Year	Volume	U-235	U-238	NO_3	CR^{+6}	Other (ppm)	pH	Pu
To Pond 2-B	1961	40,300	7.3 ppm	1.05 g/l				9.0-11.8	
	1962	106,800	8.6 ppm	1.1 g/l	6			4.0-12.0	
	1963	55,400	4 ppm	1.52 g/l	140			5.0-11.3	
	1964	37,300	2.9 ppm	.29 g/l		<1		11.0	
	1965	41,750	5.5 ppm	980,000 d/m/l .53 g/l	4,200	<1	25	3.0-11.1	
	1966	27,200			540			2.5-11.2	
	1967	110,800	10.5 ppm	50,000 d/m/l .069 g/l	7,200	<.05			
	1968	no entries							
	1969	99,900	335 ppm	82,000 d/m/l	8,000	<.05		1.4-10.1	
Year total	1970	8,100	.54 ppm		1,560			2.7-3.3	
	1971	no entries							
	1972	no entries							
	1973	121,800	22,000 d/m/l	4,500 d/m/l	438	<.05	tritium 7136		12,000 d/m/l
	1974	146,400	28,000	20,000	640	<.05		1.7-12.6	6600
	1975	4,500		13,000				7.0	
	1976	no entries							

RAW WASTE TO PONDS

Description	Year	Volume Gallons	Activity	NO_3 (ppm)	CR^{+6} (ppm)	pH	Other (ppm)
To Building 95 Pond (Pond 3)	1957	208,200	800 d/m/l	8	.01 ppm		F^- 50
	1958	482,100	1,000 d/m/l				
	1959	339,100	800 d/m/l	10	<.05	9.0	F^- 10
	1960	550,800	1,600	40		8-10.5	F^- <10
	1961	432,400	1,400	45		5.8-11.5	
	1962	459,200	1,700	68	<.05	4.5-11.4	F^- <10
	1963	667,100	2,400	10	.46	6.5-11.9	F^- 25
	1964	651,200	2,200	<5	<.05	8.9-12.0	F^- 45
	1965	661,300	2,800	<5	<.05	10.4-11.7	F^- 30
	1966	580,700	2,600	97	<.05	6.1-11.9	
	1967	308,620	2,900	21	<.08	3.8-10.5	
	1968	359,000	6,400	128	1.1	3.1-10.5	
	1969	306,000	5,800	50	.33	3.9-10.0	
	1970	299,000	4,500	11	<.05	6.3-9.4	
	1971	449,200	19,000	47	<.05	6.5-10.2	
	1972	496,500	25,000	16	<.05	2.8-11.4	Be .67
	1973	331,000	16,000	40	.09	6.1-12.2	
Raw waste to Pond 2 (old clay-lined)	1954	7,500	753				
	1955	42,300	4,000				
	1956	18,600	1,000				
	1957	291,600	1,000	5			
	1958	46,600	42,600		.01		F <10
	1959	172,800	24,000	2,400 ppm	<1 ppm	1.6-11.7	
	1960	41,400	1,300 d/m/l	162	3.9	4.5-12.5	
Treated waste to Pond 2 (old clay-lined)	1954	123,700	25,213	16,800		8.5-11.9	F 160 .59 ppm U
	1955	81,200	2,600	22,000		11.8-12.6	F^- 1000
	1956	104,100	4,000	39,700			
	1957	no entries					
	1958	78,000	2.700	800			
	1959	75,208	280,000	26,500			F^- >100 Cd <.05

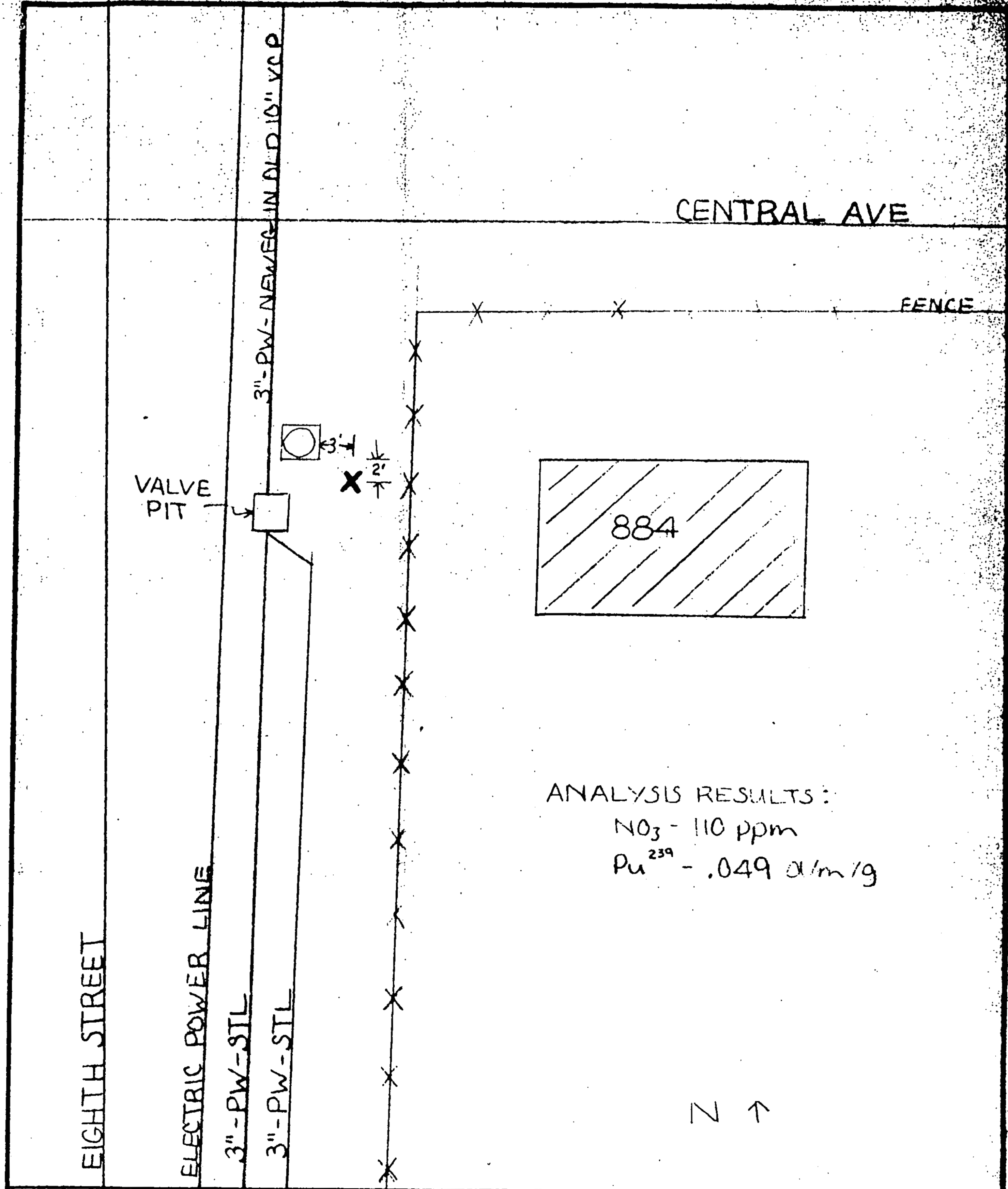
APPENDIX 3 - SOIL SAMPLES

Nine locations were chosen for soil sampling in areas where repairs or leaks have occurred. All samples were taken from the bit of an auger after drilling to about 4' deep. Soil sample pits were located as close as possible to the area of concern and generally on the northeast side. Exact distances are noted on the sketches contained in this appendix.

Soil sample analyses were conducted by the Health and Environmental Science Labs, under the direction of Weldon Williams.

Soil sample analysis results:

Sample No.	NO_3 (ppm)	Pu^{239} (d/m/g)
1	62	0.037
2	110	0.049
4	54	0.145
5	148	0.485
6	104	0.05
7	70	0.185
8	76	1.83
9	44	3.385



REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D

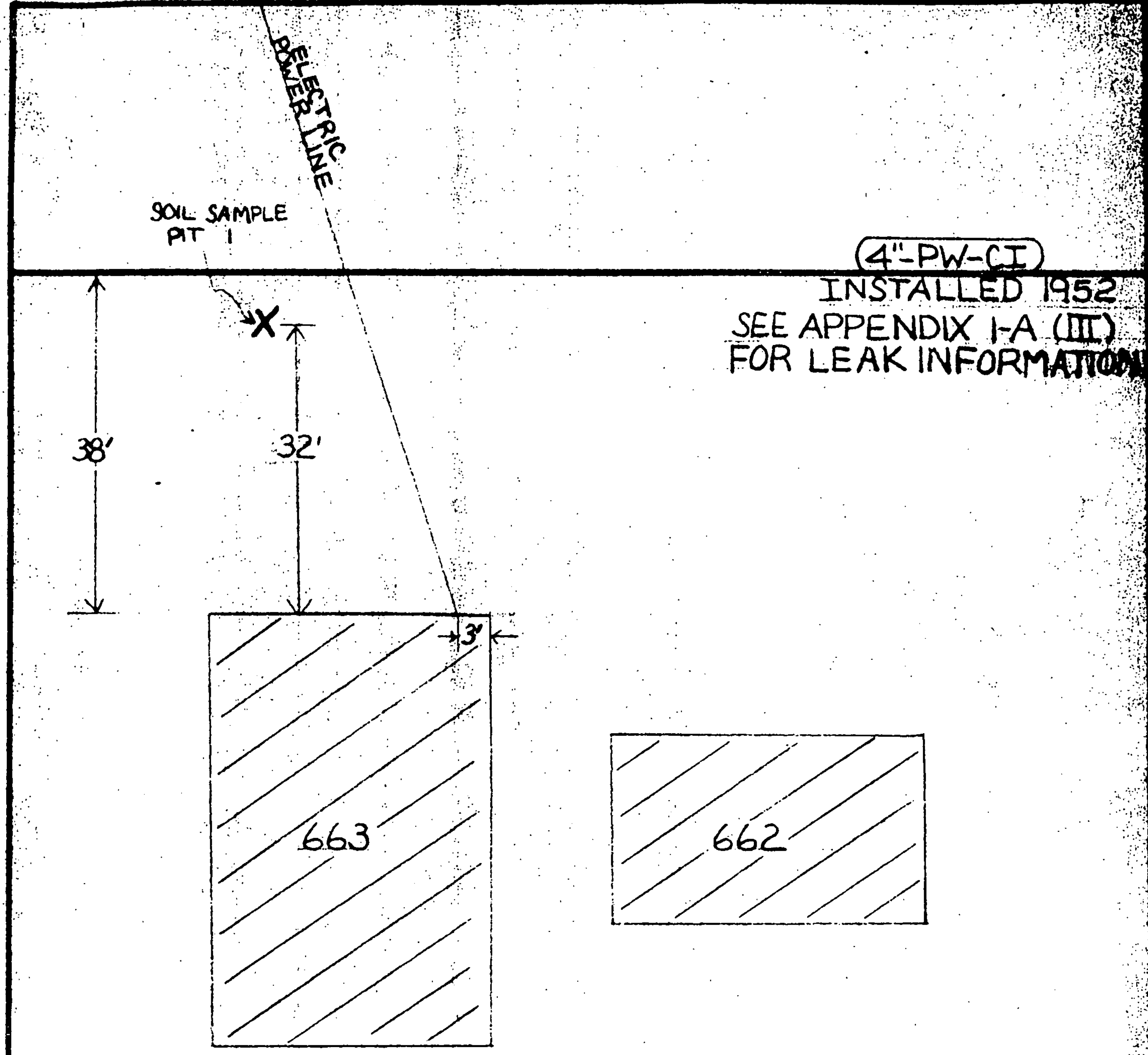
DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 2
REF DWG
15501-37 E-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

SIZE		REV.	SHEET
A	PG 3-3		OF

BLDG.
ROOM
CAT.



ANALYSIS RESULTS:

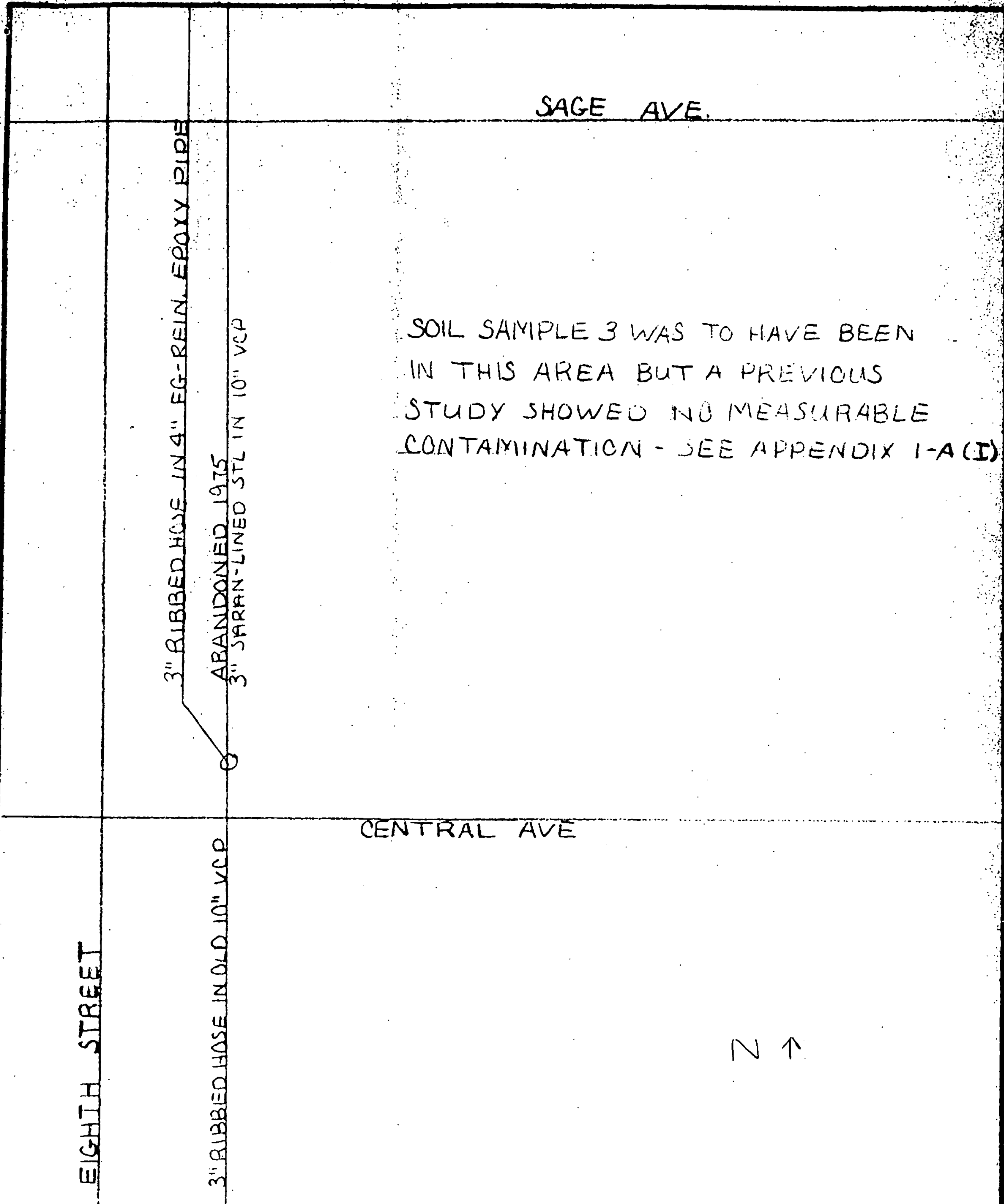
NO_3^- 62 ppm

Pu^{239} - 0.037 d/m/g

N ↑

REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D	BLDG.

DESIGNED DRAWN CHECKED APPROVED RELEASE DATE	SOIL SAMPLE PIT 1 REF DWG 15506-36 E-4	ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION E.R.D.A. CONTRACT E (29-2)-3533 ROCKY FLATS PLANT GOLDEN, COLORADO 80401				ROOM
		SIZE A	PG 3-2	REV.	SHEET OF	CAT.



REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D	BLDG.

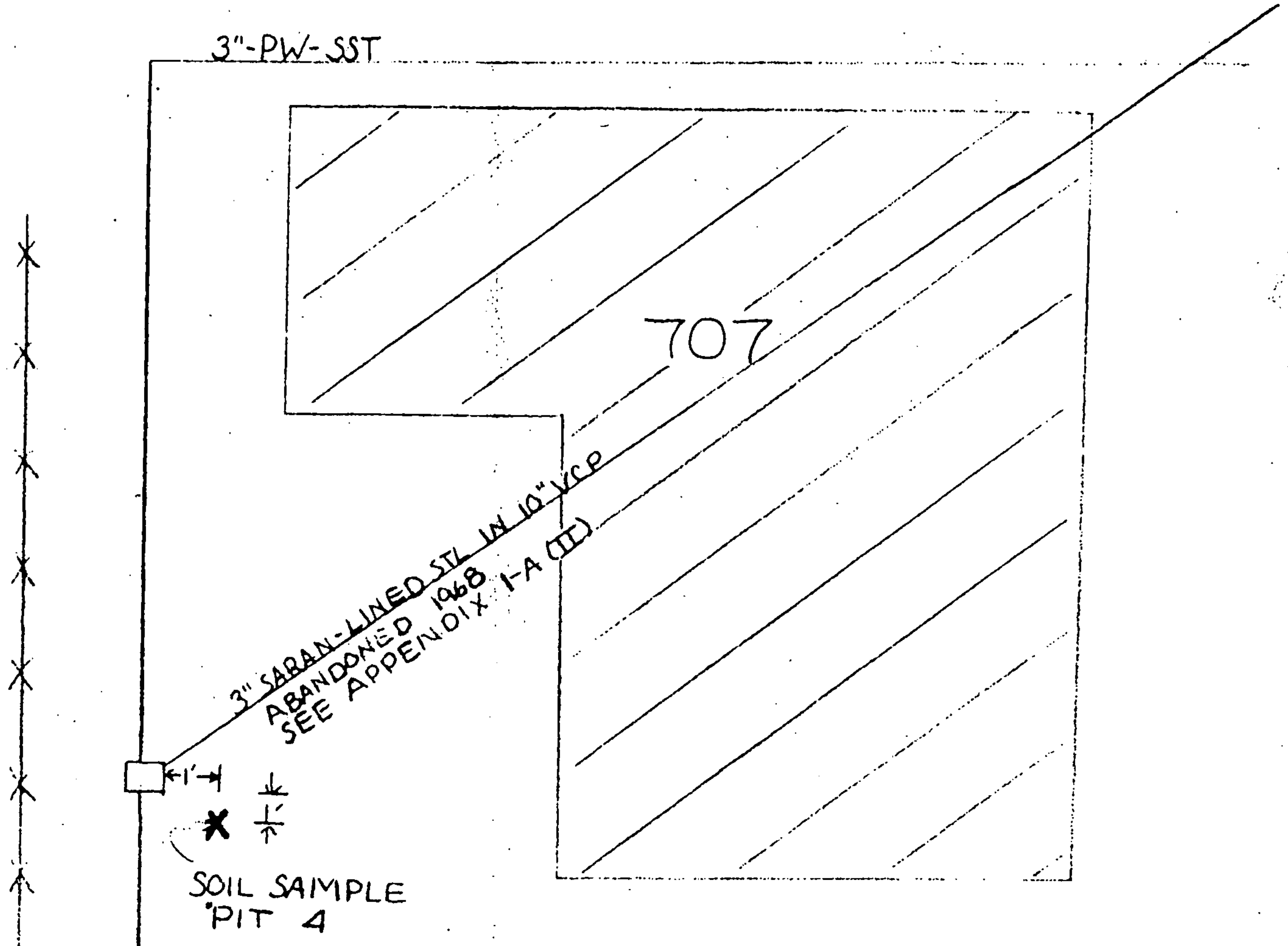
DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 3
REF DWG
15501-29 D-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

ROOM

SIZE		REV.	SHEET	CAT.
A	PG 3-4		OF	



ANALYSIS RESULTS:

NO_3 - 54 ppm

Pu^{239} - 0.145 d/m/g

REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D	BLDG.

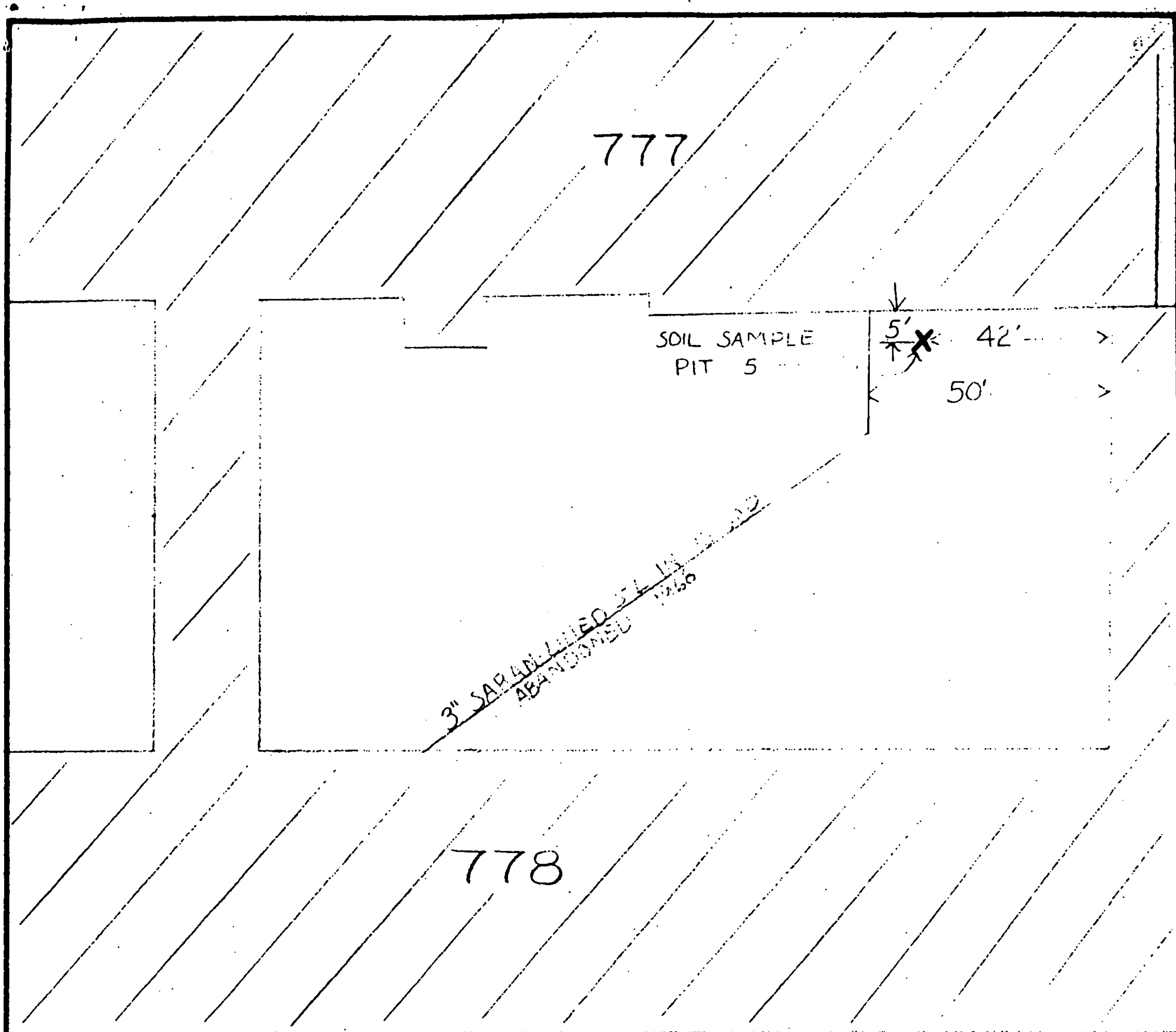
DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PIT 4
REF DWG
15501-29 D-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

ROOM
CAT.

SIZE		REV.	SHEET
A	PG 3-5		OF



ANALYSIS RESULTS:

NO_3 - 148 pp[illegible]

Pu^{234} - 0.485 [illegible]

N ↑

REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D

DESIGNED	SOIL SAMPLE PIT 5	ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION E.R.D.A. CONTRACT E (29-2)-3533 ROCKY FLATS PLANT GOLDEN, COLORADO 80401
DRAWN	REF DWG	
CHECKED	15501-21 G-5	SIZE: A — PG 3-6 — REV. — SHEET OF
APPROVED		
RELEASE DATE		

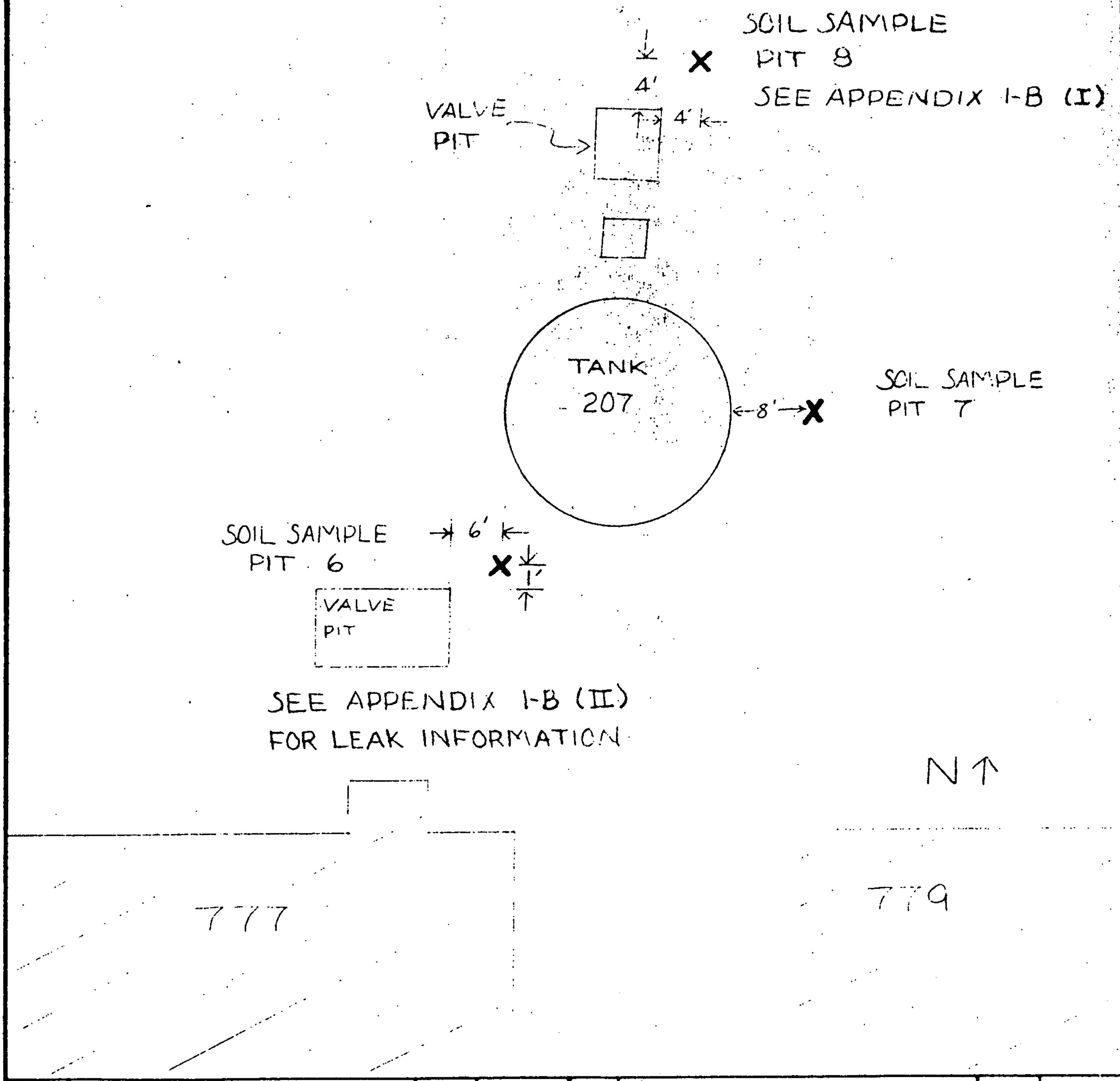
BLDG

ROOM

CAT.

ANALYSIS RESULTS:

SAMPLE NO.	NO_3 (ppm)	Pu^{239} (d/m/g)
6	104	0.05
7	70	0.185
8	76	1.83



REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D	BLDG.

DESIGNED
DRAWN
CHECKED
APPROVED
RELEASE DATE

SOIL SAMPLE PITS 6,7,8
REF DWG
15501 - 13 B-5

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
E.R.D.A. CONTRACT E (29-2)-3533
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

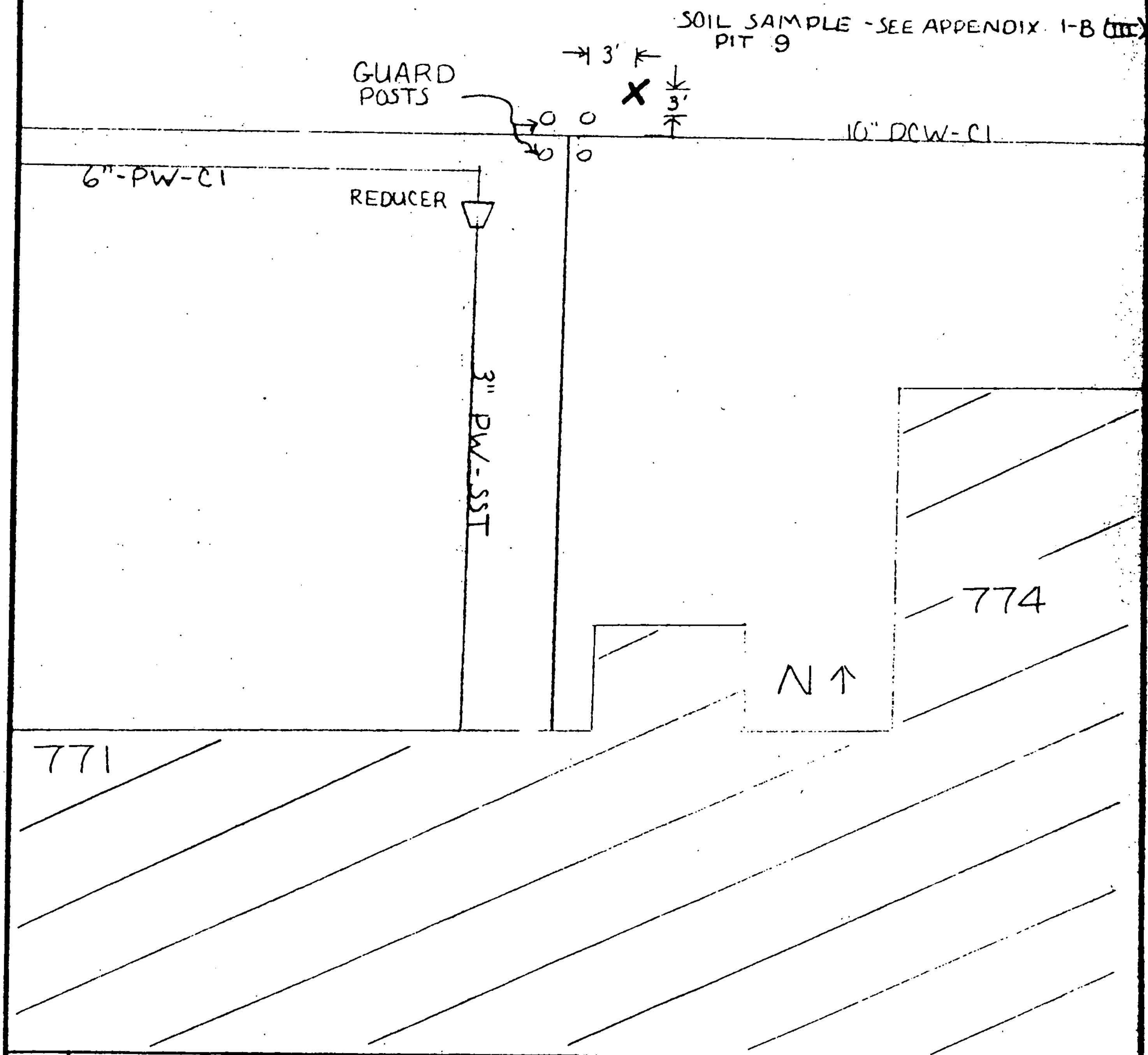
ROOM

SIZE		REV.	SHEET	CAT.
A	PG 3-7		OF	

ANALYSIS RESULTS:

NO_3^- - 44 ppm

Pu^{239} - 3.385 d/m/g



REV.	DESCRIPTION	APPR'D	CL APPR'D	REV.	DESCRIPTION	APPR'D	CL APPR'D

DESIGNED	SOIL SAMPLE PIT 9 REF DWG	ROCKWELL INTERNATIONAL ATOMICS INTERNATIONAL DIVISION E.R.D.A. CONTRACT E (29-2)-3533 ROCKY FLATS PLANT GOLDEN, COLORADO 80401
DRAWN	15501-13 B-5	SIZE: A
CHECKED		PG 3-8
APPROVED		REV.
RELEASE DATE		SHEET OF

BLDG.

ROOM

CAT.

APPENDIX 5 - LIBRARY SEARCH
PIPE CLEANING METHODS

A survey of the technical periodical indexes was conducted to search out new developments in the areas of pipe cleaning, plugging, and removal. Cross references were used in the area of nuclear wastes as well as general pipe listings.

Although there are now a number of installations in this country which handle nuclear materials, not many have been in service as long as the Rocky Flats Plant. Understandably, there has been little written on the problem of abandoning pipelines which have the potential of containing nuclear residue. Some information was found which could be helpful in cleaning the lines but nothing on pipe plugging or removal.

One very specific procedure was recommended by Dr. J. A. Ayres of Battelle Northwest:[(1)]

1. Use a solution of 18% potassium hydroxide and 3% potassium permanganate for three hours at 105° C (221° F)
2. Rinse throughly
3. Use 10% sulfamic acid for three hours at 70° C (158° F)
4. Rinse throughly

5-8. Repeat steps 1-4

Dr. Ayres has used this method to clean pipes that have carried nuclear materials. Although the temperatures seem unrealistic for cleaning pipes several hundred

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(1) <u>How to Employ Chemical Cleaning for Power and Process Piping</u>, C. M. Loucks, Heating, Piping and Air conditioning, June 1965.

feet long, the solutions could still be an improvement over those used for cleaning pipes with more typical waste products.

There is ample information suggesting that sulfamic acid is better than hydrochloric. Specifically: (2)

A. Inhibited sulfamic acid vs. hydrochloric acid
   1. sulfamic is safer to use, a more effective descaler and poses no corrosion problems
   2. the solution strength and temperature are not critical, even if an error is made, there is no danger of damage to equipment

B. Basic rules for using sulfamic acid
   1. keep it hot - the best temperature is about 160° F
   2. keep it strong - 40 lb dry acid descaler/50 gallons of water. Too much acid is uneconomical, too much water is not strong enough.
   3. keep it moving - to keep fresh, strong acid against the pipe walls

Other periodicals which might be helpful are:

<u>Applying Chemical Cleaning Solvents</u>, C. M. Loucks, Heating-Piping, September 1964.

<u>Steps for Chemical Cleaning of Piping Systems</u>, C. M. Loucks, Heating-Piping, May 1964

<u>How to Choose An Acidic Cleaner</u>, J. D. Palmer, Can. Chem. Process., January 1970

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(2) <u>It's Cheaper to Clean it In-Place</u>, C. T. Gallinger, Mill & Factory, May 1965.

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A Survey of the Rocky Flats Division Waste Streams, C. E. Plock, CRDL 950351-009, June 30, 1972

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Correspondence; letter to J. A. Watt from B. L. Kelchner; Re: Engineering Study for Abandoned Process Wastes Lines, September 22, 1975

Correspondence; letter to H. E. Bowman from B. L. Kelchner; Re: Inspectable and Repairable Process Systems

Evaluation of Two Sections of the Rocky Flats Process Waste Line, Hornbacher and Lott, PRD 950463-107, May 1972

Liquid Wastes and the Nitrate Problem at the Rocky Flats Plant, B. L. Kelchner, oral presentation given at the Problems Analysis Meeting held at Rocky Flats on May 25-26, 1971

Pressure Testing and Leak Location Survey of Process Waste Lines at the Rocky Flats Facility

REFERENCE DRAWINGS

The following drawings for location and dating of the process waste collection system are available in the Facilities Engineering and Construction Department:

Original Process Waste Lines*

15501-(Utility Drawings)
13902
25609-X08
SK-410204-(1-5)

New Process Waste Lines

25052-047

Process Waste Collection Tanks

19878-1
19878-2

* The drawings contained in this study of the process waste lines have been throughly checked and altered for accuracy. Most of the changes incorporated in the drawings are from information obtained from M. E. Maas of Waste Treatment. The numerous sketches of changes and repairs in the lines kept by Mr. Maas and his excellent memory were a most important resource in locating lines. Field checks were made whenever possible such as at entry points to buildings, valve pits, etc.